

03/10/00  
Jc759 U.S. PTO

03-13-00

A

Please type a plus sign (+) inside this box → ☐

PTO/SB/05 (4/98)  
Approved for use through 09/30/2000. OMB 0651-0032  
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>UTILITY PATENT APPLICATION TRANSMITTAL</b> (Only for new nonprovisional applications under 37 C.F.R. § 1.53(b))	Attorney Docket No.	1858-002
	First Inventor or Application Identifier	Joseph Allen, et al.
	Title	Intelligent Access Control System
	Express Mail Label No.	EK356558442US

<b>APPLICATION ELEMENTS</b> See MPEP chapter 600 concerning utility patent application contents.	<b>ADDRESS TO:</b> Assistant Commissioner for Patents Box Patent Application Washington, DC 20231
1. <input checked="" type="checkbox"/> * Fee Transmittal Form (e.g., PTO/SB/17) (Submit an original and a duplicate for fee processing)	5. <input type="checkbox"/> Microfiche Computer Program (Appendix)
2. <input checked="" type="checkbox"/> Specification [Total Pages 29] (preferred arrangement set forth below) <ul style="list-style-type: none"><li>- Descriptive title of the invention</li><li>- Cross References to Related Applications</li><li>- Statement Regarding Fed sponsored R &amp; D</li><li>- Reference to Microfiche Appendix</li><li>- Background of the invention</li><li>- Brief Summary of the invention</li><li>- Brief Description of the Drawings (if filed)</li><li>- Detailed Description</li><li>- Claim(s)</li><li>- Abstract of the Disclosure</li></ul>	6. Nucleotide and/or Amino Acid Sequence Submission (if applicable, all necessary) <ul style="list-style-type: none"><li>a. <input type="checkbox"/> Computer Readable Copy</li><li>b. <input type="checkbox"/> Paper Copy (identical to computer copy)</li><li>c. <input type="checkbox"/> Statement verifying identity of above copies</li></ul>
3. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) [Total Sheets 11]	<b>ACCOMPANYING APPLICATION PARTS</b>
4. Oath or Declaration [Total Pages ] <ul style="list-style-type: none"><li>a. <input checked="" type="checkbox"/> Newly executed (original or copy)</li><li>b. <input type="checkbox"/> Copy from a prior application (37 C.F.R. § 1.63(d)) (for continuation/divisional with Box 16 completed)<ul style="list-style-type: none"><li>i. <input type="checkbox"/> <b>DELETION OF INVENTOR(S)</b> Signed statement attached deleting inventor(s) named in the prior application, see 37 C.F.R. §§ 1.63(d)(2) and 1.33(b).</li></ul></li></ul>	7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s))
	8. <input type="checkbox"/> 37 C.F.R. § 3.73(b) Statement (when there is an assignee) <input checked="" type="checkbox"/> Power of Attorney
	9. <input type="checkbox"/> English Translation Document (if applicable)
	10. <input type="checkbox"/> Information Disclosure Statement (IDS)/PTO-1449 <input type="checkbox"/> Copies of IDS Citations
	11. <input type="checkbox"/> Preliminary Amendment
	12. <input checked="" type="checkbox"/> Return Receipt Postcard (MPEP 503) (Should be specifically itemized)
	13. <input type="checkbox"/> * Small Entity Statement(s) filed in prior application, (PTO/SB/09-12) Status still proper and desired
	14. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)
	15. <input type="checkbox"/> Other: _____

\* NOTE FOR ITEMS 1 & 13: IN ORDER TO BE ENTITLED TO PAY SMALL ENTITY FEES, A SMALL ENTITY STATEMENT IS REQUIRED (37 C.F.R. § 1.27), EXCEPT IF ONE FILED IN A PRIOR APPLICATION IS RELIED UPON (37 C.F.R. § 1.28).

16. If a CONTINUING APPLICATION, check appropriate box, and supply the requisite information below and in a preliminary amendment:  
☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) of prior application No. \_\_\_\_\_  
Prior application information: Examiner \_\_\_\_\_ Group / Art Unit: \_\_\_\_\_

For CONTINUATION or DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 4b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

<b>17. CORRESPONDENCE ADDRESS</b>					
<input type="checkbox"/> Customer Number or Bar Code Label _____ or <input type="checkbox"/> Correspondence address below (Insert Customer No. or Attach bar code label here)					
Name	Steven R. Bartholomew Hopgood, Calimafde, Kalil & Judlowe				
Address	Lincoln Building 60 East 42nd Street				
City	New York	State	NY	Zip Code	10165
Country	USA	Telephone	(212) 551-5000	Fax	(212) 949-2795

Name (Print/Type)	Steven R. Bartholomew	Registration No. (Attorney/Agent)	34,771
Signature	<i>Steven R. Bartholomew</i>	Date	3/10/00

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231.

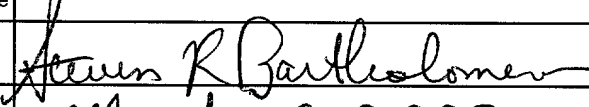
Please type a plus sign (+) inside this box → ☐

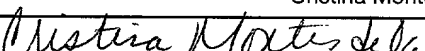
PTO/SB/21 (12-97)  
Approved for use through 9/30/00. OMB 0651-0031  
Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

<b>TRANSMITTAL FORM</b> <i>(to be used for all correspondence after initial filing)</i>	<b>Application Number</b>	New Application
	<b>Filing Date</b>	3/10/00
	<b>First Named Inventor</b>	Joseph Allen, et al.
	<b>Group Art Unit</b>	To be assigned
	<b>Examiner Name</b>	To be assigned
<b>Total Number of Pages in This Submission</b>	<b>Attorney Docket Number</b>	1858-002

ENCLOSURES (check all that apply)		
<input checked="" type="checkbox"/> Fee Transmittal Form <input checked="" type="checkbox"/> Fee Attached <input type="checkbox"/> Amendment / Response <input type="checkbox"/> After Final <input type="checkbox"/> Affidavits/declaration(s) <input type="checkbox"/> Extension of Time Request <input type="checkbox"/> Express Abandonment Request <input type="checkbox"/> Information Disclosure Statement <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> Response to Missing Parts/ Incomplete Application <input type="checkbox"/> Response to Missing Parts under 37 CFR 1.52 or 1.53	<input type="checkbox"/> Assignment Papers (for an Application) <input checked="" type="checkbox"/> Drawing(s) <input type="checkbox"/> Licensing-related Papers <input type="checkbox"/> Petition Routing Slip (PTO/SB/69) and Accompanying Petition <input type="checkbox"/> To Convert a Provisional Application <input type="checkbox"/> Power of Attorney, Revocation Change of Correspondence Address <input type="checkbox"/> Terminal Disclaimer <input type="checkbox"/> Small Entity Statement <input type="checkbox"/> Request for Refund	<input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Proprietary Information <input type="checkbox"/> Status Letter <input checked="" type="checkbox"/> Additional Enclosure(s) (please identify below): Declaration/Power of Attorney
Remarks		

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT		
Firm or Individual name	Steven R. Bartholomew Reg. No. 34,771	
Signature		
Date	March 10, 2000	

CERTIFICATE OF MAILING			
I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents, Washington, D.C. 20231 on this date: <u>EK 3565844245</u>			
Typed or printed name	Cristina Montes de Oca		
Signature		Date	3/10/00

Burden Hour Statement: This form is estimated to take 0.2 hours to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.

# **Intelligent Access Control System**

## **Field of the Invention**

The present invention relates generally to telephonic communications, and, more particularly, to techniques for overcoming shortcomings of local loop generation equipment.

## **Background of the Invention**

Ever-increasing numbers of telephone customers may be coupled to local loop generation equipment, examples of which are security systems, doorbell answering devices, and access control mechanisms. In particular, doorbell answering systems are commonly utilized in multi-family housing units. These systems generally place a switching mechanism in series with the tip/ring lines running from the telephone company central switching office to the customer premises. Normally, this switching mechanism is closed, completing a circuit between the switching office and the customer premises. In this closed state, customers are able to communicate voice and/or data over their telephone lines as if the access control system was not even present. However, this communication is subject to interruption at any time. When a visitor wishes to notify a person at a selected customer premises of his or her presence, the visitor pushes a button, or presses one or more keys on a keypad. The access control system responds to the button or key presses by opening up the circuit between the customer and the central switching office, and by providing a local loop between the visitor and the selected customer premises.

This open circuit is something of a nuisance if it interrupts a voice call already in progress. However, the open circuit is also problematic in cases where the transfer of

data is interrupted. For example, many people use a computer modem to access the Internet over conventional telephone lines. Once the circuit between the central office (CO) and the computer modem is broken, the modem will disconnect from the telephone line. The subscriber loses data during this interruption, and may also be faced with the inconvenience of having to re-log into an online service.

The circuit between the central office and the customer is broken so that a local loop may be provided between the customer premises and an access door. After the circuit has been broken, the door answering system then feeds a ringing signal to the telephone line serving the subscriber's premises. When a person at the customer premises takes a telephone off-hook, voice communications are now enabled between this person and the visitor. If this person wishes to grant the visitor access, this person presses a specified DTMF tone sequence on the telephone keypad or, alternatively, presses a lock release button separate and apart from the telephone system to grant the visitor access.

Although the foregoing example deals with local loop generation equipment in the form of a doorbell answering system, other types of local loop generation equipment present similar problems. Whenever the local loop generation equipment creates a local loop, voice and data communications between the customer and the central office are interrupted.

Refer to FIG. 1, which is a hardware block diagram of an illustrative prior art access control system. This access control system places intercom equipment 105 in series between central office 101 and housing unit 103. For the sake of clarity, FIG. 1 shows only one housing unit 103, whereas, in a more typical application, intercom equipment 105 would be placed in series between tip/ring wire pairs running from the central office 101 to each of a plurality of housing units. Tip/ring lines 115, 117 from central office 101 are coupled to a switching mechanism 107 in intercom equipment 105. Switching mechanism 107 selectively switches tip/ring lines 115, 117 to tip/ring lines 119, 121 serving housing unit 103. Normally, switching mechanism 107 is closed, completing a circuit between the switching office and the customer premises by coupling

tip line 115 to tip line 119, and ring line 117 to ring line 121. In this manner, customers are now able to place outgoing calls, and also to receive incoming calls, as if the intercom equipment 105 was not even present.

When a visitor wishes to notify a person at a selected housing unit 103 of his or her presence, the visitor pushes a button, or presses one or more keys on a keypad at a lobby interface device 111. In response to the receipt of these keypress signals at switching mechanism 107, microprocessor 109 activates switching mechanism 107 to break the connection between central office 101 and housing unit 103, and to connect housing unit 103 to lobby interface device 111, thereby forming a local loop between lobby interface device 111 and housing unit 103. More specifically, switching mechanism 107 opens up the circuit between tip line 115 and tip line 119, and also between ring line 117 and ring line 121, and closes the circuit between tip line 119 and tip line 123, as well as ring line 121 and ring line 125. The keypress signals are sent out over tip/ring lines 123, 125 which form the local loop between the lobby interface device 111 and the switching mechanism 107. The keypress signals could, but need not, be DTMF signals or pulse dialing signals.

The switching mechanism 107 forwards these keypress signals to microprocessor 109, which responds to the button or key presses by activating switching mechanism 107. The intercom equipment 105 then feeds a ringing signal, via switching mechanism 107, to a telephone at housing unit 103. When a person at housing unit 103 takes the telephone off-hook, voice communications are now enabled between this person and the visitor. If this person wishes to grant the visitor access, this person presses a specified DTMF tone sequence on the telephone keypad or, alternatively, presses a lock release button separate and apart from the telephone system to grant the visitor access.

Unfortunately, whenever a visitor activates the lobby interface device 111 to signal a resident, the resident may already be in data and/or voice communication with central office 101. If, for example, the resident is communicating over the Internet, the Internet connection will typically be lost. These breaks in communication may occur

unexpectedly, unpredictably, and repeatedly, causing the resident to become frustrated with the overall quality of telephone service.

### **Summary of the Invention**

In view of the foregoing deficiencies of the prior art, it is an object of the invention to minimize the interruption of communications between a central office and a customer premises when local loop generation equipment is in use.

It is a further object of the invention to intelligently control any interruption of communications over a telephone line between a central office and one or more customer premises devices caused by the activation of local loop generation equipment on this telephone line.

It is a still further object of the invention to allow a premises occupant to receive doorbell answering system telephone calls while already engaged in another telephone call.

It is a still further object of the invention to provide a premises occupant with a cancel door bell call waiting feature such that call waiting tones will not be sent to the premises telephone when a visitor activates the doorbell answering system and a call is already in progress.

It is a still further object of the invention to provide a premises occupant with a call waiting feature such that only calls from the doorbell answering system will cause call waiting tones to be sent to the premises telephone.

In accordance with the objects of the invention, any interruption of communications between a central office and a customer premises device is minimized by using a dedicated communications link between the local loop generation equipment and the central office. A processing mechanism at the central office determines if, when, and under what circumstances the customer premises device will be notified in response to the activation of local loop generation equipment. This eliminates the need to place local loop generation equipment in series with a communications path that runs between the

central office and the customer premises.

According to a further embodiment, the central office provides the dedicated communications link in the form of a telephone line which is equipped to place outgoing local calls, but not equipped to receive incoming calls, and not equipped to place long-distance calls.

According to a still further embodiment, the local loop generation equipment is a doorbell answering system, and the central office is adapted to implement advanced intelligent network (AIN) features. These AIN capabilities permit a premises occupant to receive doorbell answering system telephone calls while already engaged in another telephone call. These AIN capabilities may also be employed to provide a premises occupant with a cancel door bell call waiting feature such that call waiting tones will not be sent to the premises telephone when a visitor activates the doorbell answering system and a call is already in progress. Finally, these AIN capabilities may be used to provide a premises occupant with a call waiting feature such that only calls from the doorbell answering system will cause call waiting tones to be sent to the premises telephone.

### **Brief Description of the Drawings**

The foregoing and other objects and advantages of the present invention will become apparent to those skilled in the art upon reading the following detailed description of the preferred embodiments in conjunction with a review of the appended drawings in which:

FIG. 1 is an electrical block diagram showing typical prior art interconnections between customers and a central office in an operational environment where local loop generation equipment is employed.

FIG. 2 is an electrical block diagram of a system equipped to provide minimal interruption of communications between a central office and a customer in an operational environment where local loop generation equipment is used.





interface 207 also provides a mechanism for selectively switching respective tip and ring lines 124, 126 to corresponding tip and ring lines 128, 130 serving a lobby interface device 111. This switching mechanism is controlled by a microprocessor 209, operating in conjunction with a memory 211. One or more I/O devices 213 may be utilized to program the microprocessor, to provide commands to the microprocessor, and/or to accept output signals from the microprocessor. The microprocessor 209 also controls the operation of an access control device 113. Examples of access control devices are electronic door locks, solenoid-controlled latches, other types of latching mechanisms, and other programmable-controlled locking and/or enabling mechanisms.

In the configuration of FIG. 2, note that the capability of providing a communications pathway between central office 101 and housing unit 103 exists at all times. This pathway, formed over tip/ring lines 120, 122, exists irrespective of the status of intercom equipment 105. In this manner, digital and/or voice communication between the central office 101 and the housing unit 103 are not subject to being directly interrupted by intercom equipment 205. Communications on tip/ring lines 120, 122 are under the control of central office 101.

When a visitor wishes to notify a person at a selected housing unit 103 of his or her presence, the visitor pushes a button, or presses one or more keys on a keypad at a lobby interface device 111. In response to the receipt of these keypress signals at telephone line interface 207, microprocessor 209 activates telephone line interface 207 to place an outgoing telephone call to central office 101. The microprocessor 209 controls telephone line interface 207 such that the outgoing call includes data uniquely identifying the housing unit 103 for which the visitor wishes to signal his or her presence. This data may, but need not, be specified in the form of a standard DNI (dialed number identifier). Unlike the prior art system of FIG. 1, the connection between the central office 101 and the housing unit 103 is not automatically broken when the visitor activates the lobby interface device 111. Moreover, the system of FIG. 2 does not create a local loop between lobby interface device 111 and housing unit 103.

00533367-031000

The outgoing call placed by intercom equipment 205 is received at central office 101. A processing mechanism at the central office 101 uses data associated with this call, such as, for example, the DNI data, to determine what, if any, further action should be taken. This processing mechanism may, but need not, make this determination by referring to a lookup table stored in a memory device at the central office 101. For example, the DNI may be used to place a call to the housing unit 103 specified by the visitor. Certain DNIs may correspond to housing units 103 which do not wish to be disturbed, whereupon the central office 101 will not place a call to the housing unit specified by the visitor, but will instead transmit a prompt message to intercom equipment 205, indicating that this housing unit cannot be signaled from intercom equipment 205. When the central office 101 places a call to a given housing unit 103 in response to a visitor signaling the housing unit from intercom equipment 205, the call may be answered by an occupant at housing unit 103.

Pursuant to a further embodiment of the invention, microprocessor 209 of intercom equipment 205 may be programmed so as to signal to central office 101 the housing unit identification only in the form of an "encoded" dialed number. At the central office 101, AIN capabilities can be utilized to convert the "encoded" housing unit identifier, i.e., the dialed number, into the housing unit's actual phone number. Each of these "encoded" numbers could, but need not, represent a unique combination of DTMF digits that is assigned to a given housing unit. Accordingly, the AIN capabilities are used to map the sequence of DTMF digits entered into intercom equipment 205 by a visitor into an actual telephone number. Since the actual phone numbers of the housing units are resident in an AIN-equipped central office 101 database, and not provided to visitors, this option provides additional security for housing unit residents. This option also preserves the secrecy of unlisted telephone numbers.

If the call is answered, the central office 101 provides a voice communications path between housing unit 103 and intercom equipment 205 so that the visitor can talk with the occupant at housing unit 103. If the occupant wishes to grant the visitor access,



encompasses implementations where discrete elements are employed, as well as other implementations where various elements may be integrated together. Also, the microprocessor 209 of FIG. 2 is also shown for illustrative purposes, it being understood that virtually any processing mechanism could be employed. Whereas the system of FIG. 2 utilized a processing mechanism in the form of microprocessor 209, the system of FIG. 3 sets forth an embodiment which implements this processing mechanism using a central processing unit (CPU) 309.

CPU 309 is coupled to non-volatile memory 311 over a bus 310. Bus 310 is used to connect each of a plurality of peripherals to the CPU 309. However, many peripherals to the CPU 309 may alternatively be connected via dedicated ports on the CPU. As a general matter, devices that require very high throughput are connected to the CPU 309 via bus 310. Such devices include data storage drives and memory. An optional slow-scan video system 320 may also be coupled to bus 310.

Non-volatile memory 311 includes program memory 312 as well as data memory 314. Data memory 314 is used to store information required by an access control program executed by CPU 309. One example of this information includes a database of telephone numbers (FIG. 4, 426) that stores phone number(s) to be dialed by DTMF codec 326 (to be described in greater detail below) when a user at console terminal 315 wishes to signal their presence to a housing unit occupant. Each of these phone numbers is associated with a corresponding code identifier which a console user enters into a console keypad 313 so as to initiate a call to a selected housing unit 103. Data memory 314 is non-volatile, and should be equipped so as to accept updates of information from CPU 309.

A console keypad 313 is coupled to CPU 309, and may, but need not, include an array of switches or buttons. Console keypad 313 could also be implemented using a conventional QWERTY computer keyboard. The only requirement for console keypad 313 is that it provide some mechanism by which a visitor can select and signal a given housing unit. A console terminal 315 is also coupled to CPU 309. Illustrative

implementations of console terminal 315 include some type of display device (CRT (cathode-ray tube) monitors, LCD display screens, LED display panels, and/or other mechanisms for indicating and/or displaying information) combined with an input mechanism such as a conventional QWERTY computer keyboard. Console terminal 315 is used to configure the system of FIG. 3 as, for example, by establishing and maintaining one or more data tables. These data tables associate key and/or button presses on the console keypad 313 with housing unit telephone numbers. The interface also allows access to other CPU 309 programmable options such as time-out values for call progress and mute functions. The console terminal 315 can also be used to import new versions of CPU 309 software and changes to PCM decoder 328 prompts. In addition, the console terminal can be used to output diagnostic information such as a request for maintenance.

Microphone 330 is a transducer that accepts acoustical energy input as, for example, from a visitor, and converts this energy into electrical signals. Microphone 330 can be implemented using a microphone of the type employed on telephone handsets. Moreover, if privacy is desired, a telephone handset can be used in lieu of, or in addition to, speaker 334 and microphone 330.

Speaker 334 is a transducer that accepts electrical input signals and converts them into acoustical energy. Speaker 334 can be implemented using a transducer of the type employed in the earpiece of a telephone handset, and/or a speaker of the type found in radios and various other types of electronic devices. Also, the console terminal 315 may employ another speaker for the output of the PCM decoder 328 to ensure that the PCM output is audible at all times. Another illustrative configuration is to have both a speaker and a handset in a cradle. When the handset is removed from its cradle, i.e., placed off-hook, the speaker would then be muted.

For security reasons, it may be desirable to prevent visitors from introducing (by way of microphone 330) and from monitoring (by way of speaker 334) any DTMF tones that may occur on the telephone connection to the central office. Provision of a security mechanism is generally desirable for the following reasons. (1) The housing unit





closed) is under the control of the CPU 309. In typical system applications, house current is used as a power source, such that the contacts should be equipped to handle voltages up to at least 120 VAC. However, it is alternatively possible to use other power sources, whereupon appropriate contact ratings should be employed. In many system applications, the contacts are normally open, and are placed in the closed state when the door latch is released.

The access device reader 322 may be implemented using any of a variety of devices including, for example, a smart card reader, a magnetic card swipe reader, a bar code reader, a simple contact closure, a data input device, a proximity card reader, and/or an RF transponder. An example of a simple contact closure would be a key-operated switch. A key is inserted into a tumbler and, when turned, closes a set of contacts that sends an interrupt signal to the CPU 309. In response to this interrupt signal, the CPU 309 is programmed to activate the door lock release 324 to permit the door to be opened.

A more sophisticated implementation of access device reader 322 involves a reader device such as a magnetic card reader or a transponder receiver. In this implementation, data from the reader device is sent to CPU 309 which verifies the data against a verification database stored in data memory 314 and releases the door lock release 324 mechanism if the data from the reader device is valid.

Slow-scan video system 320 provides a mechanism for sending video information acquired by a camera in the vicinity of an access door to a remote location. This remote location can be a housing unit 103 and/or other security checkpoint. In the case of a housing unit 103, the occupant would most likely be equipped with a video-capable modem. Alternatively, dedicated coaxial cable lines could be provided from the camera to one or more housing units. In the case of a video-capable modem, the DTMF codec 326 and telephone interface 340 could be combined into a modem device that supports simultaneous voice and data. This would allow slow scan video to move over a conventional tip-ring telephone line for decoding and display in the housing unit 103. The slow-scan video system 320 may, but need not, be equipped to capture one or more



digital images. Having slow scan digital image capture capability could be particularly useful if combined with one-button 911 dialing. Depressing the 911 emergency key could be used to trigger the capture of image data that would assist law enforcement personnel.

Telephone interface 340 provides FCC (Federal Communications Commission) compliance to Part 95 and Part 86 of FCC Rules and Regulations. Interface 340 also provides call progress functions and monitoring. Illustrative call progress functions are on-hook, off-hook, ring detect, dial tone detect, busy detect, and call completion. Telephone interface 340 may also provide one or more standard RJ-11 jack connections.

Before power is first applied to the system of FIG. 3, or when power to one or more devices of FIG. 3 is restored after a power failure, the devices shown in FIG. 3 should be placed in the following states as part of an initialization process. The telephone interface 340 should be in the on-hook state, and the lock release 324 should be “open”. In this context, “open” means that the circuit to the lock release 324 mechanism is incomplete and, therefore, the lock is not released, but remains in the locked position. Upon application of power, the CPU 309 initializes other devices as follows. The CPU 309 first loads a copy of the operating system from program memory 312, along with current copies of a console terminal interface program and an application program. The CPU 309 downloads a button/telephone table from data memory 314, and also downloads program parameters such as time-outs. Variable space in data memory 314 is initialized to zero. The lock release 324 is open-circuit (locked – door secure), and the DTMF codec 326 is set to decode incoming DTMF signals. The console keypad 313 is “read”, the PCM decoder 328 is set to “silent”, the microphone 330 is “read”, the speaker 334 is set to “silent”, the muting device 336 is turned off, and the telephone interface 340 is set on-hook.

The CPU 309 automatically starts the current version of the application software at the time of startup. At about the same time, a process to provide a supervisory interface is started and attached to the console terminal 315 interface. The process could either use a

multi-tasking operating system or a simple foreground/background program. As part of the application startup, the program should access telephone interface 340 and place it in the off-hook condition so as to wait for detection of dial tone. If, after an appropriate time period, no dial tone is detected, the CPU 309 uses the PCM decoder 328 to output an appropriate error message to speaker 334. If this is the first time that the system of FIG. 3 has been used, then the supervisory interface program will be required to accept input parameters and table values that map console keypad 313 buttons to appropriate telephone numbers.

When a visitor wishes to call an occupant of a housing unit 103 (FIG. 2), they approach console keypad 313 and examine labels next to the keypad 313 to identify and depress one or more buttons corresponding to the housing unit they wish to contact. These depressed buttons are read by the application program running on CPU 309 (FIG. 3). The value(s) read by the CPU 309 are then used as key value(s) for indexing a lookup table of telephone numbers. If the table entry corresponding to the read key value(s) is empty, then an appropriate PCM-encoded message is outputted to the speaker 334 (i.e., "this tenant does not accept visitors"). If there is a phone number associated with the read key value(s), then the steps outlined in FIGs. 4A-4D are performed.

FIGs. 4A-4D together comprise a flowchart setting forth an illustrative operational sequence performed by the configuration of FIG. 3. The program commences at block 401 where a visitor presses one or more keys on console keypad 313 (FIG. 3) to notify a selected occupant premises (i.e., a housing unit 103) of the visitor's presence. At block 403, the CPU 309 searches the lookup table of telephone numbers to retrieve a database entry corresponding to the key or keys pressed by the visitor. Does the CPU retrieve a database entry? If not, the program goes to block 407 where the CPU triggers the outputting of an error message to PCM decoder 328 and speaker 334 (FIG. 3). The program then loops back to block 401

The affirmative branch from block 403 leads to block 405 where the CPU signals DTMF codec 326 (FIG. 3) to dial the telephone number specified by the lookup table of

telephone numbers. At block 409, the DTMF codec places a telephone call over a dedicated answering service telephone line (tip line 124 and ring line 126 of FIG. 2) to the central switching office 101 (FIG. 2). The central office receives the call from the DTMF codec and uses the DNI (dialed number identifier) of the received call to place an outgoing call to the occupant premises (i.e., housing unit 103 of FIG. 2), optionally using call waiting and/or identa-ring (distinctive ringing) features (FIG. 4B, block 411). At block 413, an individual at the occupant premises answers the call placed by the central office and can communicate with the visitor via the speaker 334 (FIG. 3) and/or microphone 330 (FIG. 3).

An individual at the occupant premises may, if desired, grant the visitor access (block 415) by pressing a predetermined DTMF key or keys on the telephone device used to answer the call at block 413. However, note that an alternate or additional mechanism for access control may be provided in the form of a separate signalling facility as, for example, a pair of wires used to close a contact, thereby releasing the door lock. This separate signalling facility is shown in FIG. 3 as a "grant access" signal input device 342 that is coupled to CPU 309. The DTMF codec receives the DTMF tone(s) entered at block 415 and forwards the decoded tone(s) to the CPU (block 417). The CPU compares the decoded tone(s) with access code(s) stored in non-volatile memory (block 419). Do the coded tones match any access code(s) stored in memory? If not, the program advances to block 424 where the CPU and the codec send an error message to the telephone device used to answer the call at block 413. The program then loops back to block 415.

The affirmative branch from block 419 leads to block 421 where the CPU activates the lock release mechanism, thereby providing the visitor with access. The CPU then instructs the codec to place the telephone interface on-hook (block 423) and the operational sequence of FIGs. 4A-4D terminates..

FIG. 5 is a flowchart setting forth a second illustrative operational sequence performed by the configuration of FIG. 3. The operational sequence commences at block

501 where CPU 309 (FIG. 3) is in an idle state until a button on console keypad 313 (FIG. 3) is pressed (FIG. 5, block 503). Once the button is pressed, at block 505, the CPU activates the muting device (FIG. 3, 336). The telephone interface (FIG. 3, 340) is placed in an off-hook state (block 507), and the telephone interface then waits for a dial tone to be detected (block 509). If dial tone is not detected within a specified time-out period (block 511), the PCM decoder 328 (FIG. 3) outputs an error message (block 527), the telephone interface is placed in an on-hook state (block 529) and the program loops back to block 501.

If dial tone is detected within the time-out period (block 511), the program advances to block 513 where the DTMF codec (FIG. 3, 326) dials the number associated with the button(s) pressed at block 503. The CPU instructs the codec to dial the appropriate number by referring to a database of telephone numbers stored in memory (block 526). The muting device is then deactivated, allowing audio to pass through (block 515). The telephone interface counts ring detects (block 517), and performs a test to ascertain whether or not a specified maximum number of ring counts have been exceeded (block 519). If the maximum number of ring counts have been exceeded, the program advances to block 525 where the PCM decoder plays out a message "No one is answering the telephone", and the program then loops back to block 529. If the maximum number of ring counts has not been exceeded, the program advances to block 521 where the call is answered by someone at the occupant premises. A call timer is started to time the duration of the answered call. If the time duration of the answered call exceeds a specified duration, the program loops back to block 529.

FIG. 6 is a hardware block diagram of a system equipped to provide minimal interruption of communications between a central office and a customer in an operational environment where the central office utilizes advanced intelligent network (AIN) protocols. Conceptually, this illustrative embodiment utilizes local loop generation equipment in the form of a doorbell answering system. This embodiment uses AIN capabilities so as to allow a premises occupant to receive doorbell answering system

telephone calls while already engaged in another telephone call. These AIN capabilities may also be employed to provide a premises occupant with a cancel door bell call waiting feature such that call waiting tones will not be sent to the premises telephone when a visitor activates the doorbell answering system and a call is already in progress. Finally, these AIN capabilities may be used to provide a premises occupant with a call waiting feature such that only calls from the doorbell answering system will cause call waiting tones to be sent to the premises telephone.

Pursuant to the aforementioned AIN capabilities, central office 101 (FIG. 6) is equipped with an AIN (advanced intelligent network) services signaling point (SSP) 610. In practice, the SSP 610 may be implemented using AIN software executed by a processing mechanism at the central office 101. An example of suitable AIN software is developed on a system generally known as the Integrated Service Control Point (ISCP)<sup>TM</sup>. The SSP 610 is coupled to one or more signaling transfer points (STP) 620 and a service control point (SCP) 640. The STP 620 and/or the SCP 640 may, but need not, be part of telephone network 630. The STP 620 forwards queries from the central office SSP 610 to the service control point (SCP) 640. Although FIG. 6 shows one signaling transfer point (STP) 620, this is for convenience, as any number of STPs 620 may be present. The signaling transfer point(s) (STP) 620 are also utilized for the purpose of transferring response messages from the service control point (SCP) 640 to the central office 101. Examples of queries include requests for call originator identity and requests for called number identity. These queries may also include standard OHD-type messages of the type well-known to those skilled in the art. Response messages instruct the SSP 610 at the central office 101 to take a certain action as, for example, to route the call to a telephone number based upon the receipt of a query message from the SSP 610.

In the context of the aforementioned AIN embodiment, an illustrative operational sequence may proceed as follows. First, a customer (the visitor) dials into the central office and accesses the AIN SSP. The SSP then queries the SCP with a standard TCAP message of the type well-known to those skilled in the art. The SCP performs logic to

determine if the residence specified by the customer in the standard TCAP message wants to receive a ringing signal when a visitor activates the doorbell answering system and, if so, what type of ringing signal (i.e., distinctive ringing) is to be provided. The SCP responds back to the SSP with instructions to route the call to a number corresponding to the residence specified by the customer and ring the residence phone with a distinctive ringing signal. Finally, the call is routed to the residence with the distinctive ringing signal. The AIN SSP monitors the duration of the call (if answered), and disconnects the call after a specified duration of, say, 120 seconds. A more specific operational sequence is presented in FIGs. 7A and 7B.

FIGs. 7A and 7B together comprise a flowchart setting forth an illustrative operational sequence performed by the configuration of FIG. 6. The sequence commences at block 701. At block 703, the visitor presses a doorbell button provided by the doorbell answering system (DAS) (FIG. 6, 605) console. The doorbell answering system CPU (FIG. 3, 309) looks up the telephone number of the tenant corresponding to the button pressed and dials a predefined telephone number (block 705) over tip/ring lines 124, 126 (FIG. 2). Next (block 707), the AIN-equipped central office 101 (FIG. 6) assigns an OHD trigger against the doorbell answering system line that includes tip/ring lines 124, 126 (FIG. 2). The SCP 640 (FIG. 6) identifies the dialed number as a tenant and instructs the SSP 610 (FIG. 6) to route the call to the tenant's telephone line (tip/ring lines 120, 122 of FIG. 2), and optionally to apply distinctive ringing to that call.

A test is implemented at block 709 to ascertain whether or not the tenant subscribes to call waiting. If not, the program advances to block 711 where the tenant's line should be provisioned with selective call waiting, generally known to those skilled in the art as the "CLASS" feature. In this manner, only calls from the doorbell answering system will initiate the call waiting function. Alternatively, a T\_Busy trigger could be assigned to all tenants. The SCP 640 (FIG. 6) would then determine if the central office should offer a call to the tenant's telephone line based on caller ID. If an incoming call is not from the doorbell answering system, the SCP would route the call to busy treatment or

forward the call to a network-based voice mail system, for example. The program then advances to block 713.

The operations of block 713 are performed if the affirmative branch from block 709 is followed or, alternatively, after the operations of block 711 have been performed. At block 713, the central office processes incoming calls from the doorbell answering system as it would any other incoming call, except that the AIN controlling leg treatment from the doorbell answering system OHD trigger, as well as subsequent routing instructions, are used to provide distinctive ringing and/or call waiting (CW) tones on the tenant's line. This distinctive ringing and/or CW tones are used to indicate that an incoming call to the tenant is from the doorbell answering system. Central office switch-based selective CW or T\_Busy triggers are applied to calls from the doorbell answering system to tenants that do not already subscribe to call waiting. However, if the tenant has enabled call blocking, the central office honors this enablement, and a Busy signal is returned to the doorbell answering system over tip/ring lines 124, 126 (FIG. 2).

At block 715, a caller ID – calling name identification is sent to the access door controlled by the doorbell answering system. The tenant answers the call (block 717) and is connected to the doorbell answering system's speaker 334 and/or microphone 330 (FIG. 3). The doorbell answering system filters out any DTMF tones introduced by the visitor through the microphone input (as discussed previously in conjunction with FIG. 3).

At blocks 721 and 725, the tenant indicates whether or not he wishes to admit the visitor (caller) by pressing a predefined DTMF key. If the tenant does not wish to admit the visitor, the call is disconnected (block 723). If the tenant does wish to admit the caller, the program advances to block 727 where the doorbell answering system awaits the arrival of an "open door" DTMF tone sequence. Once the sequence is received (block 729), DTMF filter 338 (FIG. 3) filters out the DTMF "open door" sequence so that it is not audible to the visitor. The doorbell answering system then activates the lock release 324 (FIG. 3) for a fixed time and indicates to the visitor that he or she can enter. The

program terminates at block 733.

**We Claim:**

1. An apparatus for minimizing interruption of communications on a first communications link between a central office and a customer premises telephonic device when local loop generation equipment is coupled to the first communications link, the apparatus comprising:

(a) a second communications link between the local loop generation equipment and the central office;

(b) a processing mechanism at the central office coupled to the second communications link and adapted to determine under what circumstances the customer premises telephonic device will be notified over the first communications link in response to the activation of local loop generation equipment.

2. An apparatus for intelligently controlling any interruption of communications over a first telephone line between a central office and one or more customer premises devices caused by the activation of local loop generation equipment on the first telephone line, the apparatus comprising:

(a) a second telephone line between the local loop generation equipment and the central office;

(b) a processing mechanism at the central office coupled to the second telephone



line and adapted to determine under what circumstances the customer premises telephonic device will be notified over the first telephone line in response to the activation of local loop generation equipment.

3. An apparatus for allowing a premises occupant to receive an incoming telephone call placed from a doorbell answering system on a first telephone line while the first telephone line is already in communication with a central office and the premises occupant is engaged in a telephone call on the first telephone line, the apparatus comprising:

(a) a second telephone line between the doorbell answering system and the central office;

(b) a processing mechanism at the central office coupled to the second telephone line and adapted to determine under what circumstances the customer premises occupant will be notified over the first telephone line in response to the activation of the doorbell answering system.

4. The apparatus of claim 3 wherein the processing mechanism further comprises a mechanism for providing the customer premises occupant with a door bell call waiting feature such that the central office will send call waiting tones over the first telephone line when a visitor activates the doorbell answering system and the customer premises occupant is already engaged in a telephone call on the first telephone line.

5. The apparatus of claim 3 wherein the processing mechanism further comprises a mechanism for providing the customer premises occupant with a cancel door bell call waiting feature such that the central office will not send call waiting tones over the first telephone line when a visitor activates the doorbell answering system and the customer premises occupant is already engaged in a telephone call on the first telephone line.

6. The apparatus of claim 3 wherein the processing mechanism further comprises a mechanism for providing the customer premises occupant with a door bell call waiting feature such that the central office will send call waiting tones over the first telephone line only when a visitor activates the doorbell answering system and the customer premises occupant is already engaged in a telephone call on the first telephone line.

7. The apparatus of claim 1 wherein the second communications link is provided in the form of a telephone line which is equipped to place outgoing local calls, but not equipped to receive incoming calls, and not equipped to place long-distance calls.

8. The apparatus of claim 2 wherein the second telephone line is equipped to place outgoing local calls, but not equipped to receive incoming calls, and not equipped to place long-distance calls.

9. The apparatus of claim 3 wherein the second telephone line is equipped to place outgoing local calls, but not equipped to receive incoming calls, and not equipped to place long-distance calls.

10. The apparatus of claim 1 wherein the local loop generation equipment is a doorbell answering system.

11. The apparatus of claim 2 wherein the local loop generation equipment is a doorbell answering system.

12. The apparatus of claim 1 wherein the central office utilizes advanced intelligent network (AIN) protocols adapted to permit a premises occupant to receive doorbell answering system telephone calls on the first communications link while already engaged in another telephone call on the first communications link.



when local loop generation equipment is coupled to the first communications link, the method comprising the steps of:

- (a) providing a second communications link between the local loop generation equipment and the central office;
- (b) utilizing a processing mechanism at the central office, coupled to the second communications link, for determining under what circumstances the customer premises telephonic device will be notified over the first communications link in response to the activation of local loop generation equipment.

19. A method for intelligently controlling any interruption of communications over a first telephone line between a central office and one or more customer premises devices caused by the activation of local loop generation equipment on the first telephone line, the method comprising the steps of:

- (a) providing a second telephone line between the local loop generation equipment and the central office;
- (b) utilizing a processing mechanism at the central office, coupled to the second telephone line, for determining under what circumstances the customer premises telephonic device will be notified over the first telephone line in response to the activation of local loop generation equipment.

20. A method for allowing a premises occupant to receive an incoming telephone call placed from a doorbell answering system on a first telephone line while the first telephone line is already in communication with a central office and the premises occupant is engaged in a telephone call on the first telephone line, the method comprising the steps of:

- (a) providing a second telephone line between the doorbell answering system and the central office;
- (b) providing a processing mechanism at the central office, coupled to the second

telephone line, for determining under what circumstances the customer premises occupant will be notified over the first telephone line in response to the activation of the doorbell answering system.

21. A method for controlling visitor access to an occupant premises, the method comprising the steps of:

c) an automated voice enunciation mechanism providing an enunciated voice message to the visitor indicative of progress of the telephone call and corresponding to at least one of busy signal, dial tone, and an answered call;

e) activating an access control mechanism at the occupant premises if access is to be provided to the visitor.

23. The method of claim 22 wherein the slow scan video link is implemented using modems.

- a) a phone dialing mechanism adapted to place a telephone call;
- b) a notification mechanism responsive to the phone dialing mechanism to cause a notification to be provided to a telephonic device at the occupant premises, the notification signifying that a visitor is present;

voice message to the visitor indicative of progress of the telephone call and corresponding to at least one of busy signal, dial tone, and an answered call;

d) a communications path establishment mechanism operative, when the telephone call is answered, so as to provide a communications path between the visitor and the occupant premises, thereby enabling the visitor to determine whether or not to grant access to the visitor; and

e) an access control mechanism at the occupant premises adapted to be activated if access is to be provided to the visitor.

25. The system of claim 24 wherein the communications path is provided using a slow scan video link.

26. The system of claim 25 wherein the slow scan video link is implemented using modems.

27. A system for providing selective access to an occupant premises, including:

(a) a first translation mechanism for translating telephone signalling tones into voice;

(b) a second translation mechanism for detecting a call status and translating the call status into one or more enunciated voice prompts using stored digital voice representations;

(c) an association mechanism for associating an occupant premises identifier with an occupant premises telephone number and a door answering device telephone number, so as to enable signalling of an occupant premises by placing a telephone call over the public switched telephone network to the door answering device telephone number.

## **THE ABSTRACT**

In operational environments where local loop generation equipment is used, communication interruptions between a central office and a customer premises device is minimized by using a dedicated communications link between the local loop generation equipment and the central office. A processing mechanism at the central office determines if, when, and under what circumstances the customer premises device will be notified in response to the activation of local loop generation equipment. This eliminates the need to place local loop generation equipment in series with a communications path that runs between the central office and the customer premises. The central office may provide the dedicated communications link in the form of a telephone line which is equipped to place outgoing local calls, but not equipped to receive incoming calls, and not equipped to place long-distance calls.

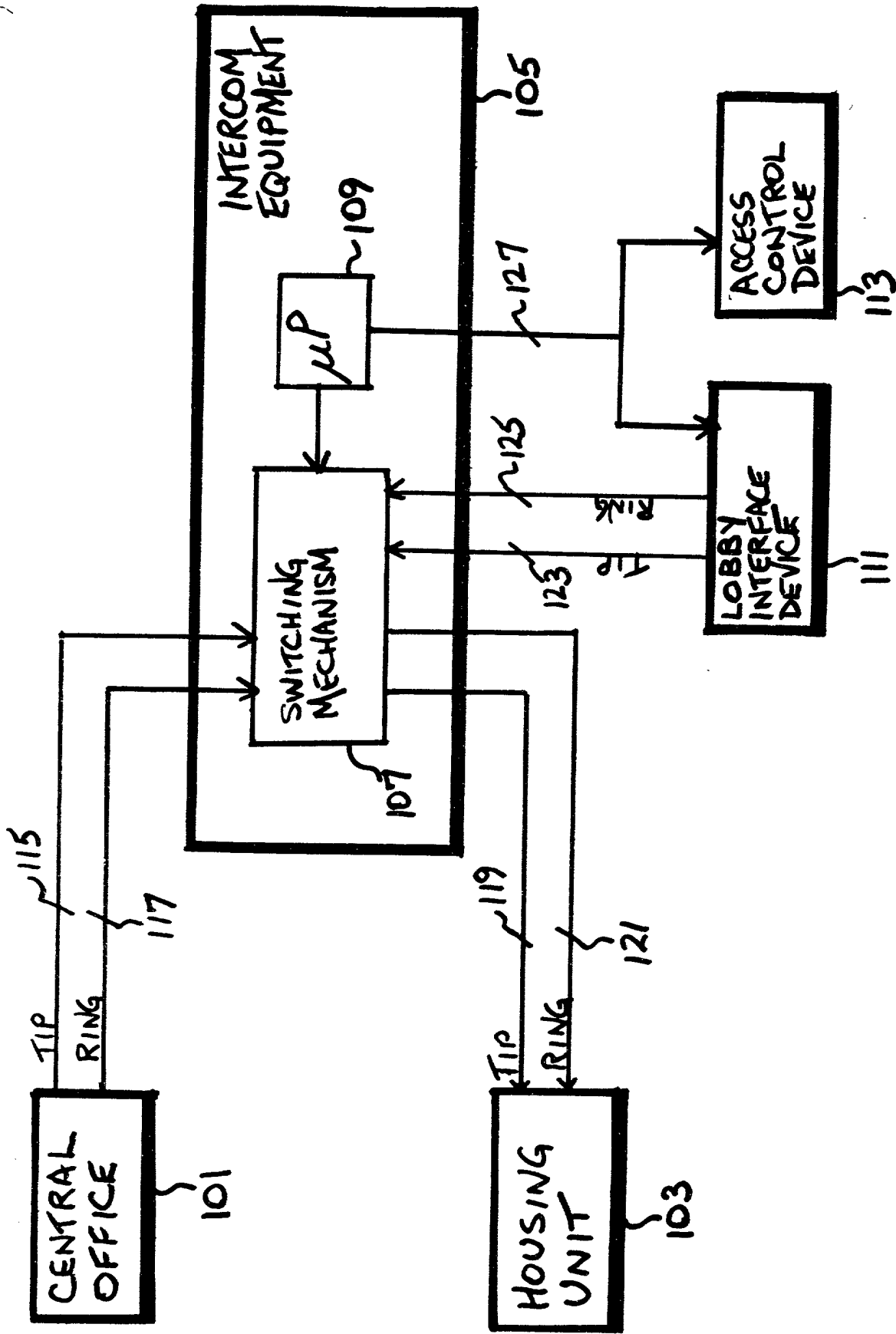


FIG. 1

PRIOR ART



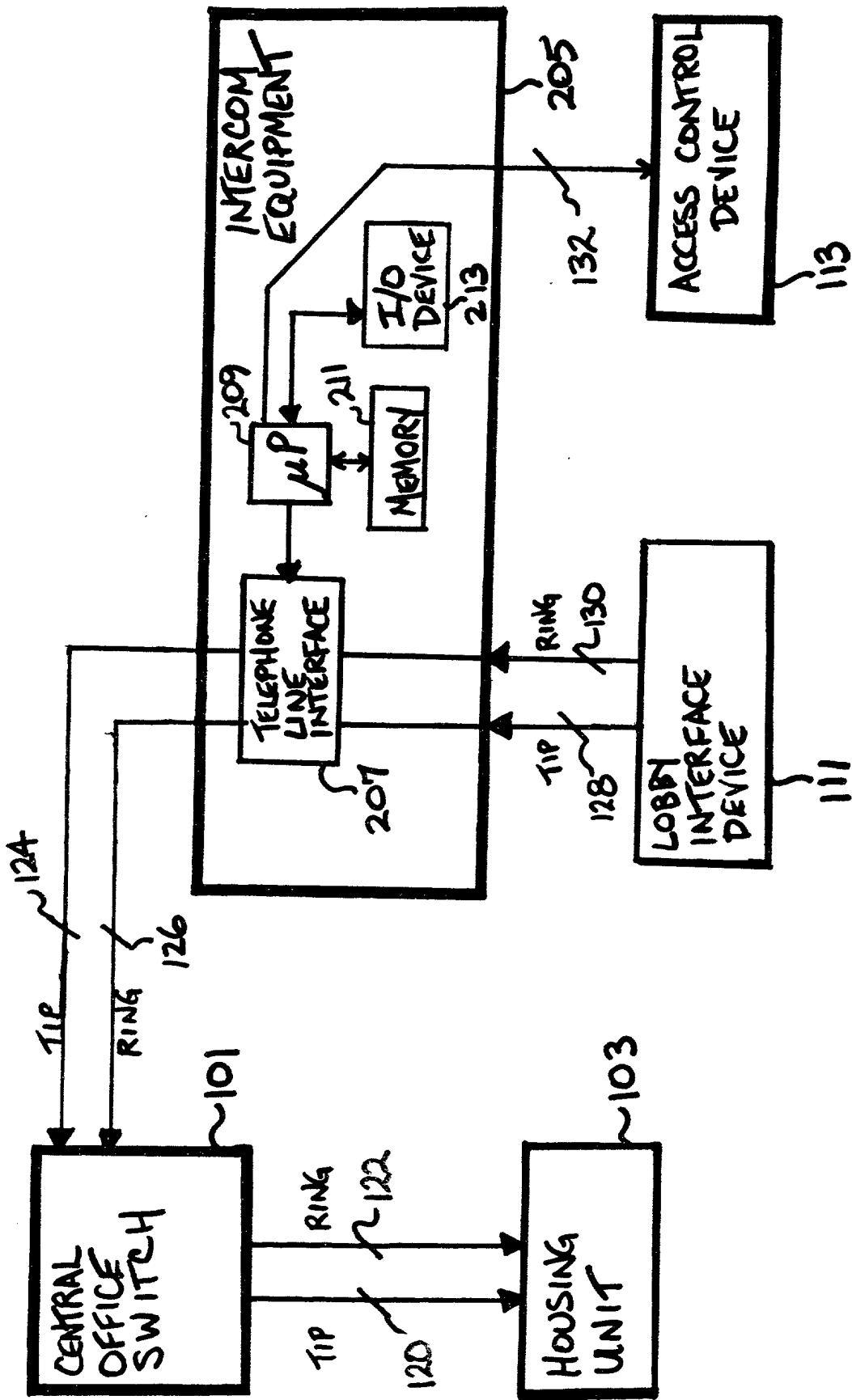


FIG. 2

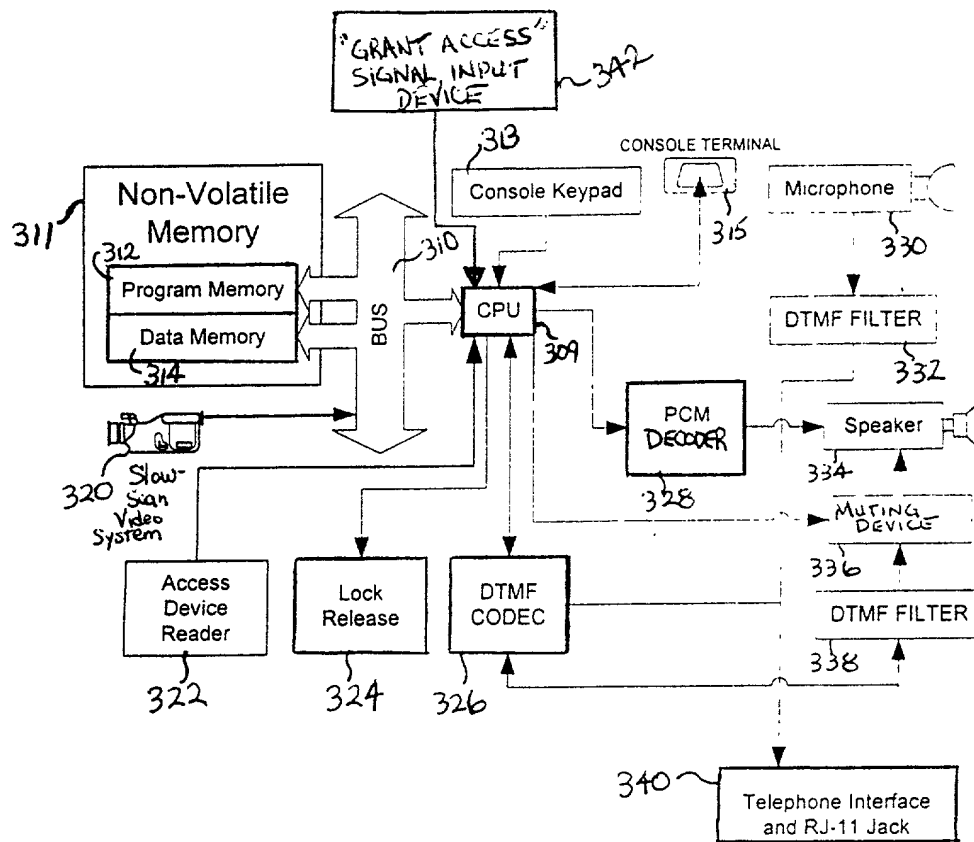


FIG. 3

VISITOR PRESSES ONE OR MORE KEYS ON THE CONSOLE KEYPAD TO NOTIFY A SELECTED OCCUPANT PREMISES OF THE VISITOR'S PRESENCE

461

CPU SEARCHES DATABASE OF TELEPHONE NUMBERS TO RETRIEVE A DATABASE ENTRY CORRESPONDING TO THE KEY OR KEYS PRESSED BY THE VISITOR. DOES THE CPU RETRIEVE A DATABASE ENTRY?

NO

SEND ERROR  
MESSAGE TO  
SPEAKER

407

YES

403

CPU SIGNALS DTMF  
CODEC TO DIAL  
TELEPHONE NUMBER  
SPECIFIED BY THE RETRIEVED  
DATABASE ENTRY

405

DTMF CODER PLACES  
TELEPHONE CALL OVER  
DEDICATED ANSWERING  
SERVICE TELEPHONE LINE  
TO CENTRAL SWITCHING  
OFFICE

409

↓  
A TO FIG. 4B  
BLOCK 411

FIG. 4A

A

FROM FIG. 4A  
BLOCK 409



411



CENTRAL SWITCHING OFFICE  
RECEIVES CALL FROM DTMF  
CODEC AND USES ANI (AUTOMATIC  
NUMBER IDENTIFIER) OF  
RECEIVED CALL TO PLACE AN  
OUTGOING CALL TO THE OCCUPANT  
PREMISES, OPTIONALLY USING CALL  
WAITING AND/OR IDENTIA-RING  
(DISTINCTIVE RINGING) FEATURES



413



AN INDIVIDUAL AT THE OCCUPANT  
PREMISES ANSWERS CALL PLACED BY  
CENTRAL SWITCHING OFFICE AND  
CAN COMMUNICATE WITH THE VISITOR  
VIA THE SPEAKER AND/OR MICROPHONE

B

TO FIG. 4C  
BLOCK 415



FIG. 4B

09523267-031000

[B] FROM FIG. 4B  
BLOCK 413

INDIVIDUAL AT OCCUPANT  
PREMISES MAY, IF DESIRED,  
GRANT VISITOR ACCESS BY  
PRESSING A PREDETERMINED  
DTMF KEY OR KEYS ON  
TELEPHONE DEVICE USED TO  
ANSWER CALL IN BLOCK 413

~415

DTMF CODEC RECEIVES DTMF  
TONE(S) ENTERED AT BLOCK  
415 AND FORWARDS CODED  
TONE(S) TO CPU

~417

CPU COMPARES CODED TONE(S) WITH  
ACCESS CODE(S) STORED IN NON-  
VOLATILE MEMORY. DO CODED  
TONE(S) MATCH ANY ACCESS CODE(S)  
STORED IN MEMORY?

~419

CPU &  
CODEC  
SEND  
ERROR  
MESSAGE  
TO TELE-  
PHONE DEVICE  
USED TO ANSWER  
CALL AT  
BLOCK 413

~42A

NO

YES  
[C] TO FIG. 4D  
BLOCK 421

FIG. 4C

00523267-031000

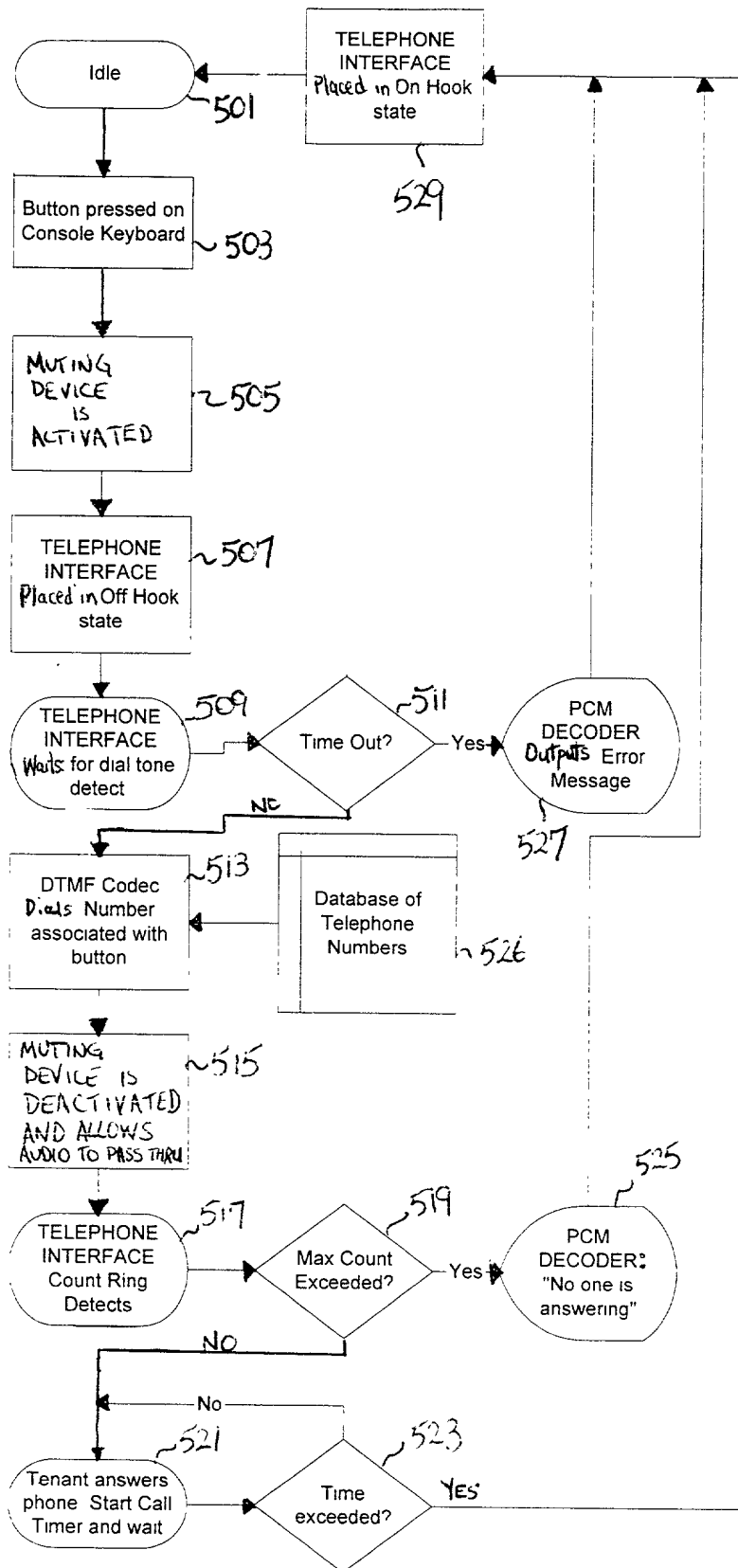
C FROM FIG. 4C  
BLOCK 419

421 CPU ACTIVATES LOCK  
RELEASE, THEREBY PROVIDING  
VISITOR WITH ACCESS

423 CPU INSTRUCTS CODEC  
TO PLACE TELEPHONE  
INTERFACE ON-HOOK

END

FIG. 4D



**FIG. 5**

0953267-034000

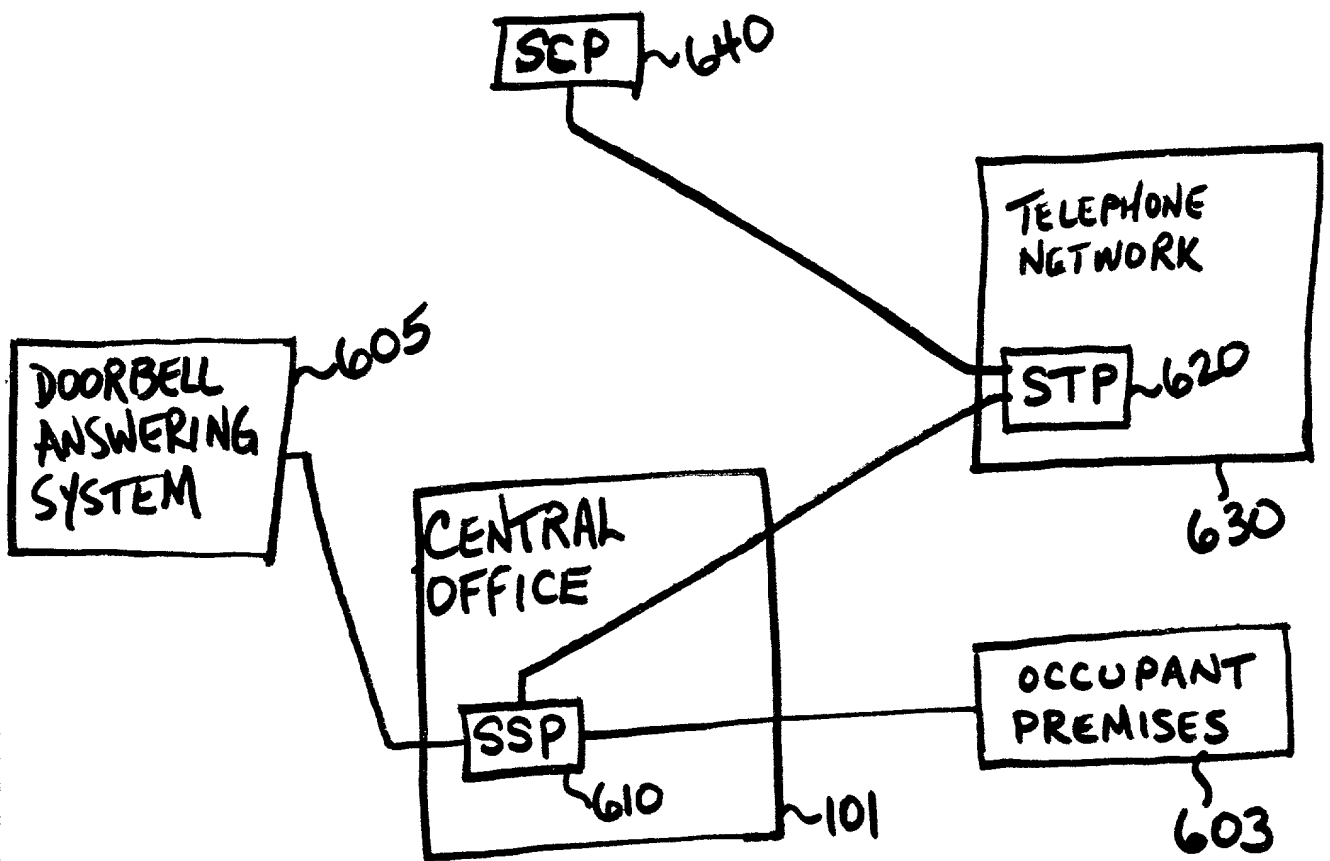


FIG. 6



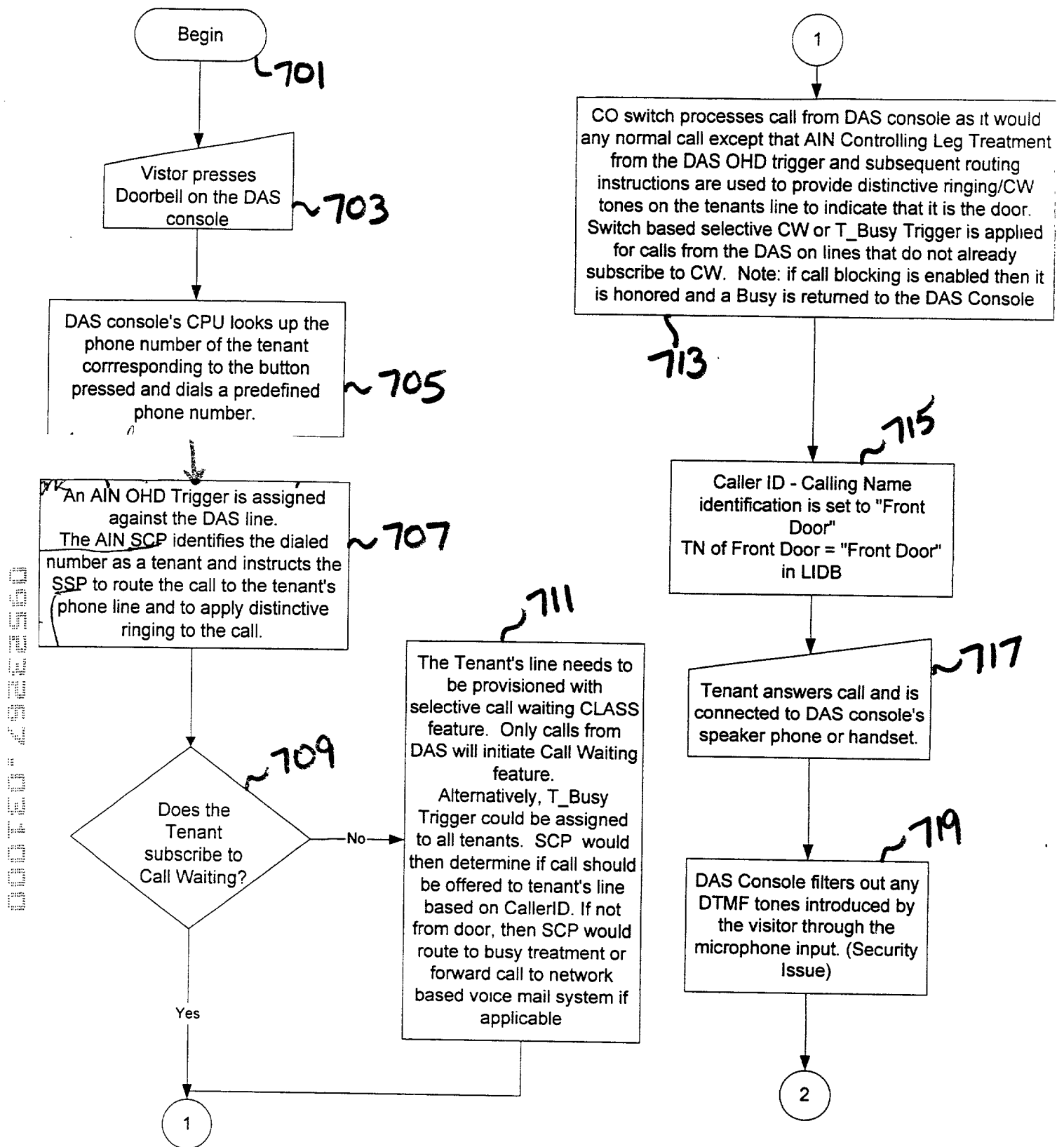


FIG. 7A

```
graph TD; 2((2)) --> 721{Does tenant wish to admit the caller?}; 721 -- No --> 723[Disconnect]; 721 -- Yes --> 725[/Tenant presses a predefined DTMF key.]; 725 --> 3((3));
```

**DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION**

As the below named inventors, we, Joseph Allen, Douglas R. Jones and Daniel O'Callaghan, whose residence, post office address and citizenship is as stated below next to our names, declare as follows:

We believe we are the original inventors of the subject matter which is claimed and for which a patent is sought on the invention entitled INTELLIGENT ACCESS CONTROL SYSTEM, the specification of which

☒ is attached hereto.  
☐ was filed on \_\_\_\_\_ as  
Application Serial No. \_\_\_\_\_  
and was amended on \_\_\_\_\_  
(if applicable)

We hereby state that we have reviewed and understand the contents of the above-identified specification, including the claims.

We acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

We hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below, and insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, we acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a).

None  
(Serial No.)

                      
(Filing Date)

                      
(Status)

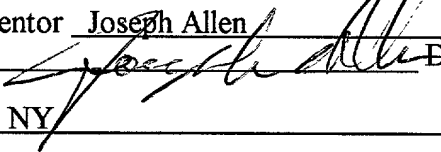
POWER OF ATTORNEY: As the named inventors, we hereby appoint the following attorneys to prosecute this application and transact all business in the Patent and Trademark Office connected therewith, Hopgood, Calimafde, Kalil, & Judlowe, a firm consisting of Roy C. Hopgood, Reg. No. 15,245; John M. Calimafde, Reg. No. 16,895; Eugene J. Kalil, Reg. No. 16,686; Marvin N. Gordon, Reg. No. 23,094; Stephen B. Judlowe, Reg. No. 21,049; Francis J. Murphy, Reg. No. 24,537; Dennis J. Mondolino, Reg. No. 27,148; William G. Todd, Reg. No. 28,480; Ira B. Winkler, Reg. No. 29,223; James M. Bollinger, Reg. No. 32,555; Porter F. Fleming, Reg. No. 31,759; Brian P. Murphy, Reg. No. 34,986 and Steven R. Bartholomew, Reg. No. 34,771.

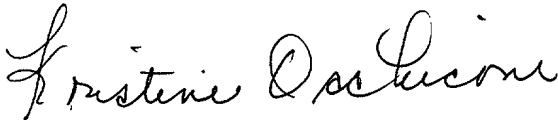
SEND CORRESPONDENCE TO:  
Steven R. Bartholomew, Esq.  
Hopgood, Calimafde, Kalil,  
& Judlowe  
60 East 42nd Street  
New York, New York 10165

DIRECT TELEPHONE CALLS TO:  
Steven R. Bartholomew  
(212) 551-5000

00523367-03100

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of the first inventor Joseph Allen  
Inventor's signature  Date 2/16/2000  
Residence New York, NY  
Citizenship U.S.A.  
Post Office Address 5030 Broadway #303, New York, New York 10034



KRISTINE OCCHICONE  
Notary Public, State of New York  
No. 01004973107  
Qualified in Rockland County  
Commission Expires October 15, 2000

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of the second inventor Douglas R. Jones  
Inventor's signature *Douglas R. Jones* Date 2-14-2000  
Residence Philadelphia, PA  
Citizenship U.S.A.  
Post Office Address 1717 Arch Street #14N, Philadelphia, PA 19103

Notarial Seal  
Elaine Jones, Notary Public  
Philadelphia, Philadelphia County  
My Commission Expires Sept. 21, 2000  
Member, Pennsylvania Association of Notaries

*Elaine Jones*  
2/14/00

We hereby declare that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Full name of the third inventor Daniel J. O'Callaghan

Inventor's signature *Daniel J. O'Callaghan* Date 2/22/00

Residence Reston, VA

Citizenship U.S.A.

Post Office Address 1880 Campus Commons Drive, Reston, VA 20191

*Diane C. Gallagher*

*Notary*

*My commission expires 1/31/03*